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PATENT APPLICATION

ATTORNEY DOCKET NO. 10990600-1

IN THE U.S. PATENT AND TRADEMARK OFFICE
Patent Application Transmittal Letter

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design☒ original patent application,☐ continuation-in-part application

INVENTOR(S): Thomas R. Knapp

TITLE: Production Of High Fidelity Copies By Consideration Of A Receiver's Characteristics

Enclosed are:

- ☒ The Declaration and Power of Attorney. ☒ signed ☐ unsigned or partially signed
☒ 3 sheets of drawings (one set) ☐ Associate Power of Attorney
☐ Form PTO-1449 ☐ Information Disclosure Statement and Form PTO-1449
☐ Priority document(s) ☐ (Other) (fee \$)

CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	13 — 20	0	X \$18	\$ 0
INDEPENDENT CLAIMS	3 — 3	0	X \$78	\$ 0
ANY MULTIPLE DEPENDENT CLAIMS	0		\$260	\$ 0
BASIC FEE: Design \$310.00); Utility \$760.00)				\$ 760
TOTAL FILING FEE				\$ 760
OTHER FEES				\$
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 760

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By Terri Walker
Typed Name: Terri Walker

Respectfully submitted,

Thomas R. Knapp

By

Matthew L. Wade

Attorney/Agent for Applicant(s)

Reg. No. 42,206

Date: Sept. 22, 1999

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Signature: *Terri Walker*

**PATENT APPLICATION
DOCKET NO. 10990600-1**

**PRODUCTION OF HIGH FIDELITY COPIES
BY CONSIDERATION OF A RECEIVER'S CHARACTERISTICS**

INVENTOR:

Thomas R. Knapp

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652259 92570460

**PRODUCTION OF HIGH FIDELITY COPIES
BY CONSIDERATION OF A RECEIVER'S CHARACTERISTICS**

FIELD OF THE INVENTION

This invention relates generally to electronic copying or printing of documents. More particularly, it relates to a method of producing high fidelity copies by considering the characteristics of the receiver.

BACKGROUND AND SUMMARY OF THE INVENTION

5 Copiers, printers, and other devices that produce copies of documents operate with the assumption that the receiver of the document image (such as paper, card stock, etc.) is of a given standard, such as material with a white color and certain texture and finish or a transparent material. This, however, is not always true. For example, paper for printing or copying comes in
10 a variety of colors, textures, and finishes. Card stock, which is much thicker than most paper and often of different colors, is also commonly used for copying and printing. The variations in a receiver's actual characteristics from typical characteristics affect the colors perceived in the copy. For example, the color blue may be produced on a white sheet of paper by depositing on the
15 paper a proper mix of subtractive toners (cyan, magenta, and yellow). But depositing the same mix of toners on a red sheet of paper will produce a color other than blue. Yet conventional copiers and printers do not take into account the receiver's colors or other characteristics when determining the mix of toners for printing the copy of a document. The fidelity of a copy may thus be less than
20 what it would have been if the receiver's characteristics were more fully considered.

An objective of the invention, therefore, is to provide a method and system for considering the characteristics of a receiver in producing a copy of a document, whether with a copier, printer, or other imaging device. By taking
25 into account the receiver's characteristics, the toners deposited on a receiver may be adjusted so that the printed colors better match the intended colors.

Additional features and advantages of the invention will be made apparent from the following detailed description of an illustrative embodiment that proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a document copying system in accordance with the invention.

Figure 2 is a block diagram of an image processor within the copying system of Figure 1.

Figure 3 is a flowchart of a method in accordance with invention for considering a receiver's characteristics in producing a copy of a document.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 is a block diagram of a document copying system 10 embodying the invention. The term "document" is to be interpreted broadly to include not only physical objects such as papers, but also computer-generated files that contain text and/or graphics. Similarly, the term "copying" is to be interpreted broadly to include the printing of a computer-generated file. Thus while the system 10 in its entirety is capable of copying physical objects, its core may be used separately to print computer-generated files or files generated by any other method such as photography.

Beginning at the left of the figure, a document scanner 12 of conventional design scans documents and generates therefrom digital document data representing the scanned document. Each document pixel is represented by a number of bits such as twenty-four that encode the color of the pixel. This data is saved in a buffer 14 where it is processed by a software routine executed by image processor 16, as will be described. Receiver data comes, in turn, from a receiver such as paper that is initially stored in a feeder 17 such as a paper hopper. When a sheet of paper is required for copying a document, the system 10 pulls the sheet from the feeder 17 and through a receiver scanner 18 of conventional design. The scanner 18, as the scanner 12, scans its contents

and generates therefrom digital data representative of the contents. In the case of scanner 18 (or other sensor appropriate to the information being collected), the scanning reveals the characteristics of the receiver such as its color, finish, texture, etc., that might affect the colors of a document printed thereon. Each receiver pixel is represented by a number of bits such as twenty-four that encode the characteristics of the pixel, such as color. The receiver data is saved in a buffer 20 where it is processed by a software routine executed by the image processor 16, as will be described.

Figure 2 is a block diagram of the image processor 16 showing the data inputs and output. The image processor includes a processor 22, memory 24, and firmware contained in the memory. The firmware includes software routines that work in accordance with the invention upon the document data and receiver data read from buffers 14 and 20, respectively. These software routines generate copy pigment data in the form of toner data that is sent to a printer engine 26 (Figure 1), where it is used to select and apply toners to the scanner receiver to produce a copy of the document. The finished copy is then conveyed to the finished copy bin 28 for pick-up.

In the illustrative embodiment, a method for considering a receiver's characteristics in producing a copy of a document is embodied in a software routine stored in the memory 24 and executed by processor 22. Prior to execution of the software routine, a document to be copied is placed in the scanner 12 and scanned, producing the document data described above. Upon activation of the scanner 12 by a user, the system 10 responds by also scanning the next sheet of receiver feeder with the scanner 18, thereby producing the receiver data also described above. These data are now in their respective buffers 14 and 20. The spatial and color resolution of these scans can vary as desired. For the document, higher resolutions (i.e., 1600 by 1200 pixels, 24 bits per pixel) provide sharper images with more color depth. For the receiver, on the other hand, average characteristics such as overall color may be acceptable, requiring lower spatial and color resolutions. The buffers must therefore be large enough to store the highest resolution data desired.

Figure 3 is a flowchart of the method embodied in the software routine. The processor 16 proceeds by determining from the receiver data the characteristics of the receiver area(s) (40). This determination may be done at a number of resolutions, from one area (using average characteristics for the entire receiver) to multiple areas represented by pixels of various sizes (using specific characteristics for each pixel). If the characteristics are other than a given standard (such as the characteristics for white paper), then the routine determines which pigments and in what amount are required to render the receiver to that standard (42). In the illustrative embodiment pigments in toners for the subtractive colors cyan, magenta, and yellow are used. The cyan pigment absorbs (removes from white light) red light, the magenta pigment absorbs green light, and the yellow pigment absorbs blue light. Percentages of pigments in these subtractive colors can therefore be mixed to get the appearance of any desired color. Absence of any pigment leaves the light reflected from the receiver unchanged; adding 100% of all three pigments turns white to black. For example, if the receiver has a red tint to it, the routine determines that a low percentage of cyan pigment should be applied to absorb red. From the document data, the routine determines what pigments and in what amount are required to render the document on the receiver area (44). The routine then generates copy pigment data for the print engine 26 from the determined receiver and document pigments, such as by adding or otherwise combining the pigment data from these two sources (46). In some circumstances the copy pigment data at this point may produce a document copy that is too dark. To prevent this, the routine checks the pigment percentages and if they are greater than a threshold amount uniformly reduces them to lighten the copy (48). The modified copy pigment data is then transmitted to the print engine, which uses it to print a copy of the document on the receiver.

Although illustrated in a copying system, the invention can be practiced in other types of systems such as printers, fax machines, combined purpose machines, etc., and the term should be interpreted broadly enough to

cover all such systems. In a printer, the document scanner 12 may not be used, the document data instead coming from an input device such as a computer or digital camera. Sensors other than scanner 18 may be used to collect information about the receiver's characteristics. It should also be recognized that

5 a user may enter the characteristics of the receiver into the copying system such through a menu, thus avoiding the need for scanning the receiver to obtain the characteristics. And while the method in the illustrative embodiment employs toners as the pigment carriers, inks and other pigment carriers may also be used in other systems such as inkjet printers where appropriate.

10 In view of the many possible embodiments to which the principles of the invention may be applied, it should be recognized that the embodiment is illustrative only. The invention, rather, includes all embodiments that come within the scope and spirit of the following claims and equivalents thereto.

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CLAIMS

What is claimed is:

1 1. A method of copying a document onto a receiver, the
2 method comprising:
3 determining the characteristics of a receiver on which the
4 document will be copied;
5 from the characteristics, determining which pigments are required
6 to render the receiver to a given standard;
7 determining which pigments are required to render a document
8 image on the receiver; and
9 generating copy pigment data for a print engine from the
10 determined receiver and document pigments, the print engine employing the
11 copy pigment data to copy the document onto the receiver.

1 2. The method of claim 1 wherein a characteristic of the
2 receiver is its color.

1 3. The method of claim 1 wherein the given standard is a
2 white color.

1 4. The method of claim 1 wherein determining the
2 characteristics of a receiver on which the document will be copied includes
3 electronically scanning the receiver.

1 5. The method of claim 1 wherein determining the
2 characteristics of a receiver on which the document will be copied includes
3 electronically sensing the receiver's characteristics.

6. The method of claim 1 wherein determining the characteristics of a receiver on which the document will be copied includes accepting user-entered receiver characteristics.

7. The method of claim 1 wherein generating copy pigment data for a print engine from the determined receiver and document pigments includes adding the determined receiver and document pigments.

8. The method of claim 1 wherein generating copy pigment data for a print engine from the determined receiver and document pigments includes modifying the copy pigment data if a pigment percentage is above a threshold amount.

9. A computer-readable storage medium on which is stored software for executing the method of claim 1.

10. A method of copying a document onto a receiver, the method comprising:

- electronically scanning a receiver;
- determining from the scanned receiver the characteristics of a receiver on which the document will be copied;
- from the characteristics, determining which pigments are required to render the receiver white;
- electronically scanning a document;
- determining from the scanned document which pigments are required to render a document image onto the receiver;
- generating copy pigment data from the determined receiver and document pigments; and
- employing the copy pigment data to copy the document image onto the receiver.

1 11. A computer-readable storage medium on which is stored
2 software for executing the method of claim 9.

1 12. A copying system comprising:
2 a buffer storing data describing a document to be copied;
3 a receiver scanner scanning receivers on which a document image
4 is to be copied and producing therefrom characteristic receiver data;
5 an image processor receiving the document data and receiver data,
6 the image processor generating copy pigment data therefrom; and
7 a print engine receiving the generated copy pigment data and
8 employing the data to copy the document onto the receiver.

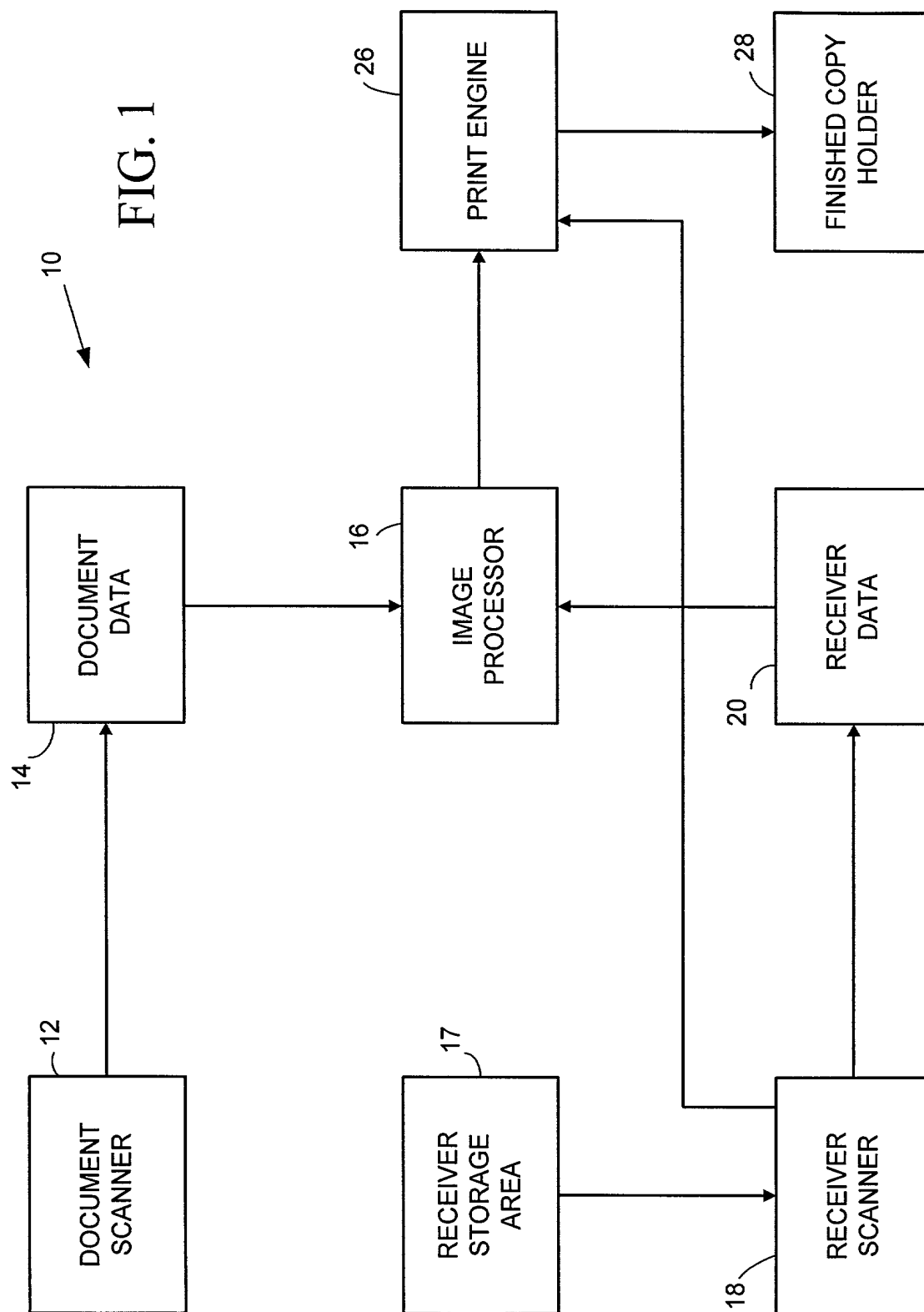
1 13. The copying system of claim 9 including a scanner scanning
2 documents to be copied and producing therefrom document data for the buffer.

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ABSTRACT

A method of copying a document onto a receiver such as paper includes taking the characteristics of the receiver into account in selecting pigments for making the copy. The characteristics may be determined by scanning the receiver to determine its color, finish, texture, etc. If the characteristics are other than a given standard such as white, the pigments necessary to render the receiver area(s) white are determined. Concurrently, the pigments needed for copying the document onto the receiver are also determined. An image processor then generates copy pigment data from the receiver and document pigments and transmits the data to a print engine in the form of toner data. If the copy pigment data might produce too dark a copy, the data is modified uniformly to reduce pigment percentages.

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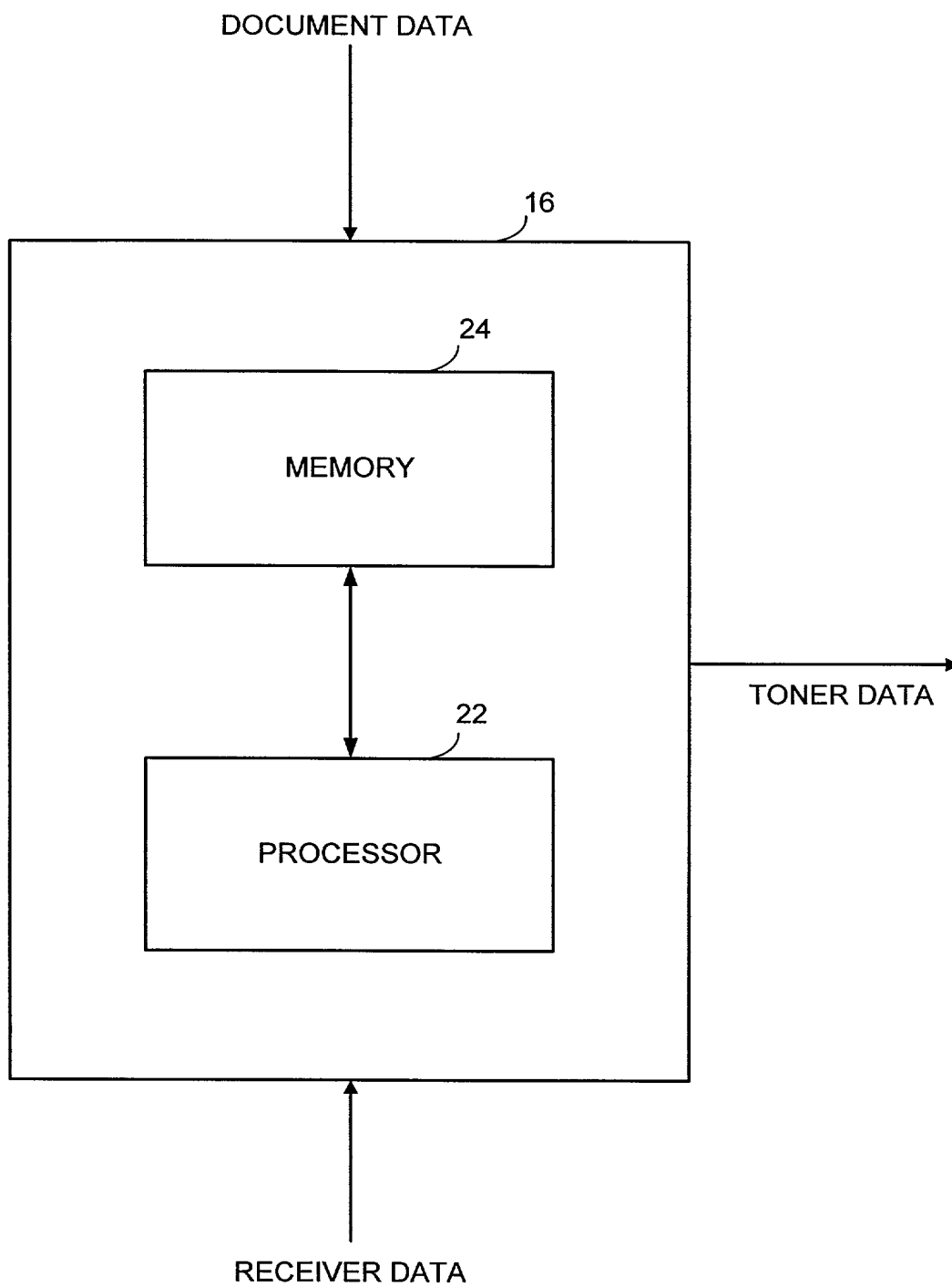


FIG. 2

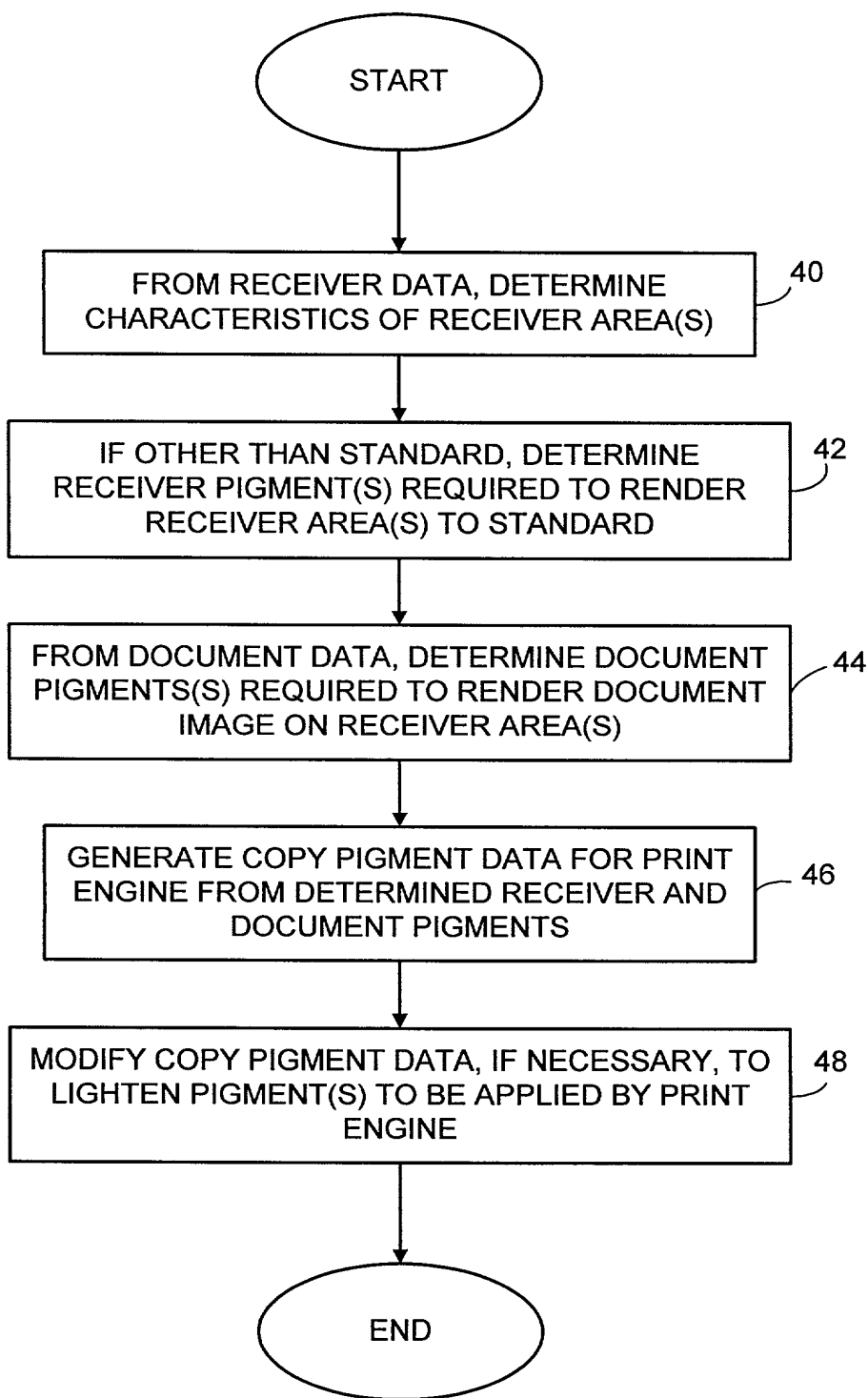


FIG. 3

**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION**ATTORNEY DOCKET NO. 10990600-1

As a below named inventor, I hereby declare that:

My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Production Of High Fidelity Copies By Consideration Of A Receiver's Characteristics

the specification of which is attached hereto unless the following box is checked:

() was filed on _____ as US Application Serial No. or PCT International Application Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
			YES: _____ NO: _____
			YES: _____ NO: _____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE

U. S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) listed below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Matthew L. Wade**Anthony J Baca****Lane R. Simmons****Leslie G. Murray**Reg. No. **42,406**Reg. No. **33,472**Reg. No. **37,721**Reg. No. **31,183**

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Inventor: Thomas R. KnappCitizenship: USResidence: 2655 W. Timber Drive, Eagle, ID 83616Post Office Address: Same as residence

Inventor's Signature

Date

September 22, 1999